2019

A note on science, legal research and artificial intelligence

Sean Goltz
Edith Cowan University

Giulia Dondoli

10.1080/13600834.2019.1644065
This is an Accepted Manuscript of an article published by Taylor & Francis in *Information & Communications Technology Law* on 17 July 2019, Available online: http://www.tandfonline.com/10.1080/13600834.2019.1644065
This is an Author's Accepted Manuscript of: Goltz, N., & Dondoli, G. (2019). A note on science, legal research and artificial intelligence. *Information & Communications Technology Law*. 28(3). Available here
This Journal Article is posted at Research Online.
https://ro.ecu.edu.au/ecuworkspost2013/6541

A Note on Science, Legal Research and Artificial Intelligence

Nachshon (Sean) Goltz[*] & Giulia Dondoli[**]

"We become what we behold. We shape our tools and then our tools shape us"[1]

Abstract

This paper discusses the principles of scientific research and in turn review legal research that was done using Artificial Intelligence arguing that it is the tools (Artificial Intelligence) that take center stage while the meaning (legal research) is left back stage. In turn, this kind of research does not adhere to the fundamentals of scientific research nor comply with scientific and industry ethical codes.

Keywords: Science, Legal Research, Artificial Intelligence, Big Data

Introduction

Few months ago, I (the first author) was invited to a workshop around law, Big Data and machine learning. I talked with local colleagues about my unethical experience with an American leading university and a major legal information provider. When they expressed their lack of surprise, I realized there was a gap between the local norms and my expectations.

This understanding deepened and extended when one of the workshop's participants presented his research employing machine learning in order to measure the effect of lawyer's voice masculinity when saying 'may I please the court' on the court's decision. My attempt to draw attention to the problematic nature of such research, i.e., the lack of any valuable application, was firmly rejected.

I encountered a dismissive and patronizing approach focusing on my alleged lack of technology proficiency. I realized that when one need to establish that there is even an issue, it means that there is a fundamental gap, much harder to explain. This gap, in turn, mark the existence of an ethical deviation. This deviation extends beyond the intersection of law and Artificial Intelligence to what Lipton and Steinhardt call, "Troubling trends in machine learning scholarship".[2]

The reasons for these troubling trends can be only speculated, though there are reasons to believe they can, at least partially, be found in Ellul's[3] 'technical

[*] Senior Lecturer, School of Business and Law, Edith Cowan University; Editor in Chief, Global-Regulation.com.
[**] Research Associate, Te Piringa – Faculty of Law, University of Waikato.

[1] John M. Culkin, 'A Schoolman's Guide to Marshall McLuhan' (*Saturday Review*, 1967) < file:///Users/ngoltz/Desktop/A-Schoolmans-Guide-to-Marshall-McLuhan-1.pdf> accessed May 22, 2019.

[2] Zachary C. Lipton and Jacob Steinhardt, (2018). 'Troubling Trends in Machine Learning Scholarship' *(ICML 2018: Machine Learning Debates)* <http://approximatelycorrect.com/2018/07/10/troubling-trends-in-machine-learning-scholarship/> accessed May 22, 2019.

[3] Jacques Ellul, *The Technological Society* (Vintage Books 1967).

civilization', described by Merton in the forward to Ellul's book as, "committed to the quest for continually improved means to carelessly examined ends. Indeed, technique transforms ends into means. What was once prized in its own right now becomes worthwhile only if it helps achieve something else. And, conversely, technique turns means into ends. 'Know-how' takes on an ultimate value."[4]

In a previous paper, "The Work of Law in the Age of Artificial Intelligence",[5] we argued that the research of the intersection of law and Artificial Intelligence is challenging as it is dominated by those who research the latter. It was suggested that the intelligence being developed at this intersection is a legal intelligence, and as such should be led by legal experts and not computer scientists.

This paper extends this perspective by reviewing legal research that was done using Artificial Intelligence and arguing that it is the tools (Artificial Intelligence) that take center stage while the meaning (legal research) is left back stage. In turn, this kind of research does not adhere to the fundamentals of scientific research nor comply with scientific and industry ethical codes.

Part I will review the basics of scientific research and research methods. Part II will discuss Merton's norms of scientific research followed by Part III discussing specific aspects of research ethics and Artificial Intelligence. Part IV analyzes a few examples of research done in the field of law using Artificial Intelligent tools, in light of the principles outlined in Parts I, II and III. Finally, the conclusions provide suggestions for the future.

Part I – Scientific Research

Research has been defined in a number of different ways. In a broad sense, Colibao argue that, "the definition of research includes any gathering of data, information, and facts for the advancement of knowledge."[6] Similarly, the Merriam-Webster Online Dictionary defines research in more detail as "a studious inquiry or examination; especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws".[7] Moreover, research needs to be understood as a "process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question.[8] Finally, research is also "the use of this stock of knowledge to devise new applications".[9]

Strongly related to the term 'research', is the term 'scientific method'. The scientific method should not be viewed as a static toolkit of methods to achieve scientific research. It is instead a set of actions, for example: "systematic observation and experimentation, inductive and

---

[4] Ibid.

[5] Nachshon Goltz and Joel Gilmore, 'The Work of Law in the Age of Artificial Intelligence, or How is the Academy Dealing with the "Fourth Revolution"?' (2018) 1(2) Robotics, Artificial Intelligence & Law 27

[6] Martyn Shuttleworth, 'Definition of Research' (*Explorable.com*, 2008) < https://explorable.com/definition-of-research > accessed on May 22, 2019.

[7] Encyclopedia Britannica, 'Research' (*m-w.com*) <https://www.merriam-webster.com/dictionary/research> accessed on May 22, 2019.

[8] J. W. Creswell, *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (3rd ed, Pearson 2008).

[9] OECD, 'Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities' (*OECD Publishing*, 2015) <http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en> accessed on May 22, 2019.

deductive reasoning, and the formation and testing of hypotheses and theories."[10] The popular understanding of scientific method can be summarized as follow: scientists determine facts by direct observation of as much data as they can gather; then they organize this data and propose hypotheses to understand it. These hypotheses can then be tested by subsequent studies.[11]

The philosophical attempt to clarify the meaning of knowledge, and the methods to achieve it, track back to ancient Greek philosophers and spans throughout human history. In the 4th century BC, Epicurus proposed two fundamental rules to conduct an inquiry, which combined are a unique inquiry method. There is, first, a requirement for the existence of initial concepts to demarcate the problem, that is to say that the observer needs to be aware of empirical facts that constitute the initial concepts. Second, there is the requirement for empirical facts to provide a solution to the inquiry.[12] In other words, after a careful observation of the empirical facts, the scientific methods require logic to understand these facts and infer beyond what is known, i.e. inferring what is unobserved from what can be observed. However, as Epicurus states, before applying logical reasoning to the empirical observation, the first fundamental steps is to understand the problem itself.[13]

During the scientific revolution in the 16th and 18th centuries, great minds such as Galileo Galilei, Francis Bacon and Isaac Newton, not only greatly advanced human knowledge on medicine, science and physic; they also reflected upon the legitimacy of scientific research and methodology.[14] Famously, Galileo Galilei developed the idea that the scientific method is composed by three components: controlled experiments, mathematical analysis, and conceptual investigation.[15] In particular, scientific knowledge has to be built upon the interplay of the three components and "no combination could supply the absence of any one of them."[16]

The common ground of these definitions and explanation of research and scientific method is the 'advancement of knowledge' and the 'increase of understanding' through the study, examination or experimentation that is led by a theory, an hypothesis or a law. In his work, Merton[17] codified and crystallised these variegated set of concepts and in doing so he highlighted the social values of scientific research.

Merton argues that science is a "deceptively inclusive word which refers to a variety of distinct though interrelated items". Among these items Merton counts: "(1) a set of characteristic methods by means of which knowledge is certified; (2) a stock of accumulated knowledge stemming from the application of these methods; (3) a set of cultural values and mores governing the activities termed scientific; or (4) any combination of the foregoing".[18]

According to Merton, the technical methods to extend the 'certified knowledge' are "empirically confirmed and logically consistent predictions". While empirical evidence is a prerequisite for sustained true prediction; logical consistency is a prerequisite for systematic and valid prediction. These mores, according to Merton, "possess a methodologic rationale but they are binding, not because they are procedurally efficient, but because they are believed

[10] Hanne Andersen and Brian Hepburn, 'Scientific Method' (November 13, 2015) In Edward N. Zalta (ed), *The Stanford Encyclopaedia of Philosophy* <https://plato.stanford.edu/archives/sum2016/entries/scientific-method/> accessed on May 22, 2019.
[11] Errol E. Harris, *Hypothesis and Perception: The Roots of Scientific Method* (Routledge 2014) 19.
[12] Elizabeth Asmis, *Epicurus' Scientific Method* (Cornell University Press 1984) 333.
[13] Ibid 21.
[14] Andersen and Hepburn (n 10).
[15] Armando Machado and Francisco J. Silva, 'Toward a Richer View of the Scientific Method: The Role of Conceptual Analysis' (2007) 63(7) American Psychologist 671, 672.
[16] Stillman Drake, *Discoveries and Opinions of Galileo* (Anchor Books 1957) 224.
[17] Robert K. Merton 'A Note on Science and Democracy' (1942) 1 J Legal & Pol. Soc 115.
[18] Ibid 116.

right and good. They are moral, not technical, prescriptions".[19] The next section discusses Merton's norms and highlights how scientists have been engaging with them.

Part II – Merton's Norms and beyond

In 1942, when Merton published his well-known article on the normative structure of science,[20] science was, or was perceived to be, threatened by anti-intellectual criticism, nationalist ideologies, and racist politics.[21] For Marton, this context defined the broader goal of his article: "An institution under attack must reexamine its foundations, restate its objectives, seek out its rationale. Crisis invites self-appraisal…A tower of ivory becomes untenable when its walls are under assault"[22].

While encountering criticism,[23] Merton's four norms of science remains central for the definition of science: *Universalism* – the acceptance or rejection of scientific claims should be based on impersonal criteria, *communism* – the fruits of science should not be privately owned, *disinterestedness* — the fundamental function of science is to advance knowledge, and *organized skepticism* — scientific knowledge is continuously subjected to the scientific community's test. This section focuses on the latter two.

Disinterestedness means that, through the presence of institutional controls, such as peer review, publication, and replication of research results, the potential distortion by individual motivation is being filtered out. Conversely, if the accountability of scientists to their peers is diminished or eroded by ideological or economic forces, a real and damaging loss of scientific integrity and objectivity will result. According to Merton,[24] "There is a competition in the realm of science, competition which is intensified by the emphasis on priority as a criterion of achievement, and under competitive conditions there may well be generated incentives for eclipsing rivals by illicit means. But such impulses can find scant opportunity for expression in the field of scientific research. Cultism, informal cliques, prolific but trivial publications – these and other techniques may be used for self-aggrandizement".[25]

Organized skepticism is interrelated with all the other Merton's norms. *Organized skepticism* should be both regarded as a methodologic and an institutional mandate. According to Merton, organized skepticism is "The suspension of judgment until 'the facts are at hand' and the detached scrutiny of beliefs in terms of empirical and logical criteria have periodically involved science in conflict with other institutions". [26] In other words, the scientific method, to study both 'hard' and 'soft' (social) sciences, require facts free from preconceived prejudice.[27]

---

[19] Ibid 117.
[20] R. K. Merton, 'The Normative Structure of Science' in R. K. Merton (ed) *The Sociology of Science: Theoretical Empirical Investigations* (University of Chicago Press 1942/1973) 267.
[21] Hans Radder, 'Mertonian Values, Scientific Norms, and the Commodification of Academic Research' in Hans Radder (ed) *The Commodification of Academic Research: Science and the Modern University* (University of Pittsburgh Press 2014) 231.
[22] Merton (n 17) 115.
[23] B. Barnes, 'Catching up with Robert Merton: Scientific Collectives as Status Groups' (2007) 7(2) Journal of Classical Sociology 179; B. Barnes and D. Bloor, 'Relativism, Rationalism and the Sociology of Knowledge' in M. Hollis and S. Lukes (eds), *Rationality and relativis*m (Oxford 1982) 21; S. B. Barnes and R. G. A. Dolby, 'The Scientific Ethos: A Deviant Viewpoint' (1970) 11(1) Archives Europeennes de Sociologie 3; M. Mulkay, 'Norms and Ideology in Science' 15(4-5) Social Science Information (1976) 637.
[24] Merton (n 17) 124-5.
[25] See the account by Logan Wilson, *The Academic Man.* (Oxford University Press 1942).
[26] Merton (n 17) 126.
[27] Ibid.

Still nowadays researchers dwell on the scientific method and on the nature of research. In doing so, scientists inevitably engage with Merton's norms. Related to Merton's norm of *organized skepticism*, Ketokivi and Choi explain that one of the primary features of scientific research is transparency. This means that, to be able to evaluate the merits of an argument, a scientist needs to have access both to "the logic that generates the conclusion and the premises that support it."[28] They focus on operational management, still clarifying that their considerations can apply to other social sciences, like law, and they criticize much of existing literature based on case-study analysis because these types of studies often do not properly disclose and acknowledge the theoretical framework that underpin them. Instead, in order to achieve transparency, researchers need to explain how and why they set up the premises of their case-studies.[29] Ketokivi and Choi's work engages with *organized skepticism*, because, just as Merton, they stress the need for science research to advance knowledge. It goes without saying that when a plethora of case-studies do not achieve transparency, they cannot properly be challenged and reproduced by the scientific community.

Related to *disinterestedness,* Succi and Coveney tackle the methodologic issues related to Big Data, which is also at the core of this paper. The authors highlight that, for some, the amount of data that can be stored, combined with the use of Artificial Intelligence to find patterns in these data, seems to make the research methods obsolete. According to this view, with enough data anything can be inferred, correlation replace causation and there is no need for scientists developing models and general theories to explain these patterns.[30] In particular, Succi and Coveney highlight the commercial use of Big Data analysis, which is done to increase sales and, we add, without complying with Merton's norm of *disinterestedness*. The authors counterpose those views by explaining the relation between data, information, knowledge and wisdom. They claim that data need to be contextualized to draw information from it, consequently information needs to be analyzed to infer knowledge and such a knowledge can be understood through hypothesizing a model to explain its cause. Finally, the wisdom gained in this process can be used to optimize the model by starting the process again.[31] In sum, Succi and Coveney argue that Big Data and Artificial Intelligence approaches are extremely useful tools to address scientific problems. But researchers still need theories to make sense of what it is discovered through Big Data analysis.[32]

In drawing from Merton's concepts of science and liberal democracy, Brown and Guston highlight that the right to research is not an absolute one, it actually comes with related obligations. Indeed, the right to research needs to be balanced with the research in question contribution to democracy.[33] The fact that Big Data and Artificial Intelligence enable the pursue of certain inquiries, does not mean there is no need to question whether such enquiries should be done, i.e. what their social benefits are. Big Data is a great research tool, but indeed, it is just a tool, not a scientific method per se. To become a scientific method, Big Data analysis needs to be coupled with a theoretical framework to actually produce knowledge and fulfil science's moral goals.

---

[28] Mikko Ketokivi and Thomas Choi, 'Renaissance of Case Research as a Scientific Method' (2014) 32 Journal of Operations Management 232, 232.
[29] Ibid 237.
[30] Sauro Succi1 and Peter V. Coveney 'Big Data: the End of the Scientific Method?' (*Philos Trans A Math Phys Eng Sci.*, 18 February 2019) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6388004/> accessed May 22, 2019
[31] Ibid 12.
[32] Ibid 15.
[33] Mark B. Brown and David H. Guston, 'Science, Democracy, and the Right to Research' (2009) 15 Sci Eng Ethics 351, 352.

Already in the 1960s, Merton describe the 'Technical Man' as fascinated by the technological advancement and constantly eager to find the best way to standardize and quantify phenomena. But Merton warned scientists not to fall in the trap of extreme fascination with technological tools. In the forward to Ellul's *The Technological Society*, Merton writes: "It is not a question of minimizing the importance of scientific activity, but of recognizing that in fact scientific activity has been superseded by technical activity to such a degree that we can no longer conceive of science without its technical outcome…science has become an instrument of technique".[34] In line with Merton's considerations, we argue that the dissociation between the technological tool to gather empirical data and the theoretical framework to understand such data raises ethical questions on Big Data analysis.

Part III – Artificial Intelligence, Big Data and Ethics

Big data can be defined based on large volumes of extensively varied data that are generated, captured, and processed at high velocity.[35] Big data and its analysis are at the centre of modern science and business,[36] and can be beneficial to humans in multiple fields like healthcare,[37] business,[38] e-commerce, e-government, science, and security.[39] According to Gunther et. al.[40], the opportunities arising from big data analytics for organizations are considered pivotal; big data has been described as, "the mother lode of disruptive change in a networked business environment".[41]

At the same time, Big Data analysis is a growing ethical concern, and there are not yet rigorous parameters for ethical research. Mittelstadt and Floridi identified five major ethical themes, through content meta-analysis, that emerged from the literature: informed consent, privacy, ownership, epistemology, and the 'Big Data divide';[42] They conclude, "As is often the case with emerging technologies and sciences, a tendency has been recognized to overemphasize the potential benefits of Big Data as a means of explaining 'everything', perhaps without the need for theories or frameworks of understanding".[43]

Furthermore, according to Crawford, "Data fundamentalism," or the idea that "correlation always indicates causation, and that massive data sets and predictive analytics always reflect

---

[34] Ellul (n 3) 9.

[35] D. Laney, 3D Data Management: Controlling Data Volume, Velocity, and Variety. (Gartner.com, 2001) <http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf.> accessed May 22, 2019.

[36] C. Eaton and others, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data (Mc Graw-Hill Companies 2012).

[37] Wang Yichuan, Ann Kung Lee and Anthony Byrd Terry, 'Big Data Analytics: Understanding its Capabilities and Potential Benefits for Healthcare Organizations' (2018) 126 Technological Forecasting and Social Change 3.

[38] Elisabetta Raguseo, 'Big Data Technologies: An Empirical Investigation on their Adoption, Benefits and Risks for Companies' (2018) 38(1) International Journal of Information Management 187.

[39] H. Chen, R.H.L. Chiang and V.C. Storey, 'Business Intelligence and Analytics: From Big Data to Big Impact' (2012) 36 (4) MIS Quarterly 1165.

[40] Wendy Arianne Günther and others, 'Debating Big Data: A Literature Review on Realizing Value from Big Data' (2017) 26(3) The Journal of Strategic Information Systems 191.

[41] B. Baesens and others, 'Transformational Issues of Big Data and Analytics in Networked Business' (2014) 38 (2) MIS Quart. 629, 629.

[42] Brent Daniel Mittelstadt and Luciano Floridi, 'The Ethics of Big Data: Current and Foreseeable Issues in Biomedical Contexts' (2016) 22(2) Science and Engineering Ethics**,** April 303.

[43] W. Callebaut, (2012). Scientific Perspectivism: A Philosopher of Science's Response to the Challenge of Big Data Biology' (2016) 43(1) Studies in History and Philosophy of Science, Part C: Studies in History and Philosophy of Biological and Biomedical Sciences 69.

objective truth" are influencing the public, mass media and researchers in a problematic way.[44] Practitioners are more concerned with communicating how 'good' or 'responsible' they are, Mittelstadt and Floridi argue, rather than investigating what these concepts mean in the context of specific Big Data practices; "Such broad brush attitudes towards Big Data should be avoided if its ethical implications are to be given serious consideration throughout the life of emerging Big Data practices, products and applications".[45] Finally, Metcalf and Crawford argue that there are growing discontinuities between the research practices of data science and established tools of research ethics regulation.[46]

Based on Merton's norms, the background above and given the specific field of legal research we have identified two major problems relating to the ethical conduct of Big Data research. First, existing code of academic research conduct do not properly cover the ethical issue raised by Big Data,[47] and second, Big Data approaches analyze a variety of public records with the misleading assumption that because this data is already public, it pose minimal risk to the human subjects.[48] These two aspects are addressed in turn.

First, there has been some international attempts to codify a body of norms that enhance academic research ethics. In 2010, at the Second World Conference on Research Integrity, with hundreds of attendees, the Singapore Statement of Research Integrity was drafted, aimed to promote an agreed standard of ethical conduct among researchers around the world. The Singapore Statement is based upon four founding principles of honesty, accountability, professionalism and stewardship, and it propones a number of key responsibilities for research. Because these statements were drafted nearly a decade ago, they do not take into consideration ethical issues related to Big Data and Artificial Intelligence analysis. However, there are two responsibilities that are particularly relevant to our discussion. One is research methods: "Researchers should employ appropriate research methods, base conclusions on critical analysis of the evidence, and report findings and interpretations fully and objectively."[49] And the other is societal considerations: "Researchers and research institutions should recognize that they have an ethical obligation to weigh societal benefits against risks inherent in their work."[50] We argue that much of the legal research conducted using Artificial Intelligence do not comply with these two principles because the stewardship of legal experts is lacking.

Second, the European Union has codified a body of rules on data protection, in the General Data Protection Regulation (GDPR). Bennett and Bailey argued that the GDPR contains a more accurate and faithful expression of the various policy instruments that currently comprise the 'governance of privacy',[51] while Zarsky contends that among the challenges data protection law

---

[44] K. Crawford, 'The Hidden Biases in Big Data' (*Harvard Business* Review, 2013). http://blogs.hbr.org/2013/04/the-hidden-biases-in-big-data/ accessed on May 22, 2019

[45] Mittelstadt and Floridi (n **Error! Bookmark not defined.**).

[46] Jacob Metcalf and Kate Crawford, 'Where are Human Subjects in Big Data Research? The Emerging Ethics Divide' (2016) 3(1) Big Data & Society <https://journals.sagepub.com/doi/full/10.1177/2053951716650211> accessed on May 22, 2019.

[47] See also C. Christians, 'Religious Perspective on Communication Technology' (1997) 1(1) Journal of Media and Religion 37, 43.

[48] Metcalf and Crawford (n 46).

[49] David B. Resnik and Adil E. Shamoo, 'The Singapore Statement on Research Integrity' (2011) 18(2) Account Res. 71.

[50] Ibid.

[51] Colin J. Bennett and Robin M. Bayley, 'Privacy Protection in the Era of 'Big Data': Regulatory Challenges and Social Assessments' in Bart van der Sloot, Dennis Broeders and Erik Schrijvers (eds) Exploring The Boundaries of Big Data (Amsterdam University Press 2016) 212.

faces in the digital age, the emergence of Big Data is perhaps the greatest.[52] Moreover, as part of the GDPR's drafting process, companies engaged in Big Data voiced their concerns regarding the GDPR provisions impact on their business.[53]

Article 5 of the GDPR postulates the data minimization principle, which is that data collected shall be "adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed".[54] It was argued that the clash between the data minimization principle and the practices of Big Data analysis is intuitive,[55] and even that the business model of Big Data is antithetical to the principle of data minimization.[56] This seems to be the case with ethical research using Big Data.

Big Data analysis not only poses risk deriving from how the data is gathered, but also on the basis of how this data is analyzed.[57] In other words, the fact that Big Data is gathered from the public domain, does not mean that any type of research can (or should) be done with it. We share Walther's view that there is the need for the presumption that "research must hold promise of advancing knowledge in order to justify any intrusion on human subjects",[58] If the research does not produce benefit, the inconvenience created to the human subject is not justifiable.[59] By using the GDPR's language, researcher needs to bear in mind the principle of data minimization when conducting Big Data analysis. Even though Big Data is publicly available, only the data that is useful and beneficial for the pursue of knowledge should be used. It goes without saying that when the theoretical framework is not properly posed, and the research question is not carefully juxtaposed to the society goals of the research in question, the principle of data minimization cannot be fulfilled.

Metcalf and Crawford correctly point out that part of the reason why Big Data analysis is ethically problematic relies on the fact that often researchers who use Big Data analysis are computer scientists, applied mathematicians and statisticians, who have not historically engaged in research conducted on human-subjects.[60] Arguably, this historical condition makes them less aware of the possible harm to the human subject that (unwillingly and unknowingly) 'participate' in their studies. The next part provides few examples of case studies on legal issues conducted without legal scholar stewardship. Various problems are highlighted.

Part IV - Examples and Analysis

Chen, Halberstam and Yu focused their study on extraneous factors in courtrooms and analyzed how the tone of the voice of male lawyers effect the decisions of the Supreme Court of the United States (SCOPUS). The authors use Artificial Intelligence to identify patterns and they claim that lawyers are statistically more likely to win a case when their voice is perceived as less masculine. The authors do

[52] Tal Z. Zarsky, 'Incompatible: The GDPR in the Age of Big Data' (2017) 47(4) Seton Hall Law Review 995, 996.
[53] Jennifer Baker, 'EU Data Protection Proposals Taken Word for Word from US Lobbyists' (TECHWORLD, Feb. 12, 2013) <http://www.techworld.com/news/security/eu-data-protection-proposals-taken-word-forward-from-us-lobbyists-3425637> accessed on May 22, 2019.
[54] European Union General Data Protection Regulation, 2012/0010 (COD) Implemented on 25 May 2018 at Article 5.
[55] Zarsky (n 52) 1010;
[56] Bennet and Bayley (n 51) 210.
[57] Metcalf and Crawford (n 46) 11.
[58] Joseph B. Walther, 'Research Ethics in Internet-Enabled Research: Human Subjects Issues and Methodological Myopia' (2002) 4 Ethics and Information Technology 205, 205.
[59] Ibid.
[60] Metcalf and Crawford, above n 36, at 2.

not aim to establish any causal connection between male lawyers' tone of voice and SCOPUS decisions. However, they claim that "our findings suggest that vocal characteristics may be relevant in even as solemn a setting as the Supreme Court of the United States."[61] With their study, the authors test whether there is a correlation between lawyers' voices and SCOTUS outcomes. Once they do establish this correlation, they leave to future studies to "determine the causal mechanisms behind such relationships."[62]

Even though the authors emphasize that their goal is not to advance any claim on the causal connection between lawyers' voice and SCOPUS adjudications, this study is highly problematic. Even though the data analyzed by the three authors is publicly available, this data is attached to human beings who are involved in the study unknowingly. This alone would be problematic from an ethical point of view. But in addition to that there is the fact that the authors of the study do not clarify the reasons for their analysis and they do not specify the benefit that society would acquire form the inconvenience create to the 'participants'. Because these aspects are not specified, the research contravenes the data minimization principle and its interference with the human subjects is unjustifiable. Moreover, the authors do not really contribute to advancement of knowledge. They simply run the algorithm to establish a correlation between two factors, and delegate other to find a meaning for their own inquiry. It is not clear what is the 'why' of this study. Which therefore lacks transparency and does not comply with Merton's *organized skepticism*. This is because lacking an explanation of the premises and of the logic of the study, the analysis is not replicable. Therefore, it appears clear that this article does not contribute to knowledge and it does not fulfil science societal duty, making the study a waste of time and resources.

This, in turn, implies that the research is lacking in Merton's *Disinterestedness* since the potential distortion by individual motivation has not been filtered out. Therefore, since the accountability of scientists to their peers is diminished or eroded by ideological or economic forces (Ellul's 'Technology Man'), a real and damaging loss of scientific integrity and objectivity will result. As Merton[63] states, "Cultism, informal cliques, prolific but trivial publications – these and other techniques may be used for self-aggrandizement",[64] in the scientific competition.

In a similar study, Danziger, Levav and Avnaim-Pesso research how external factors influence judges' decisions. The authors focused on judges' two daily food breaks, and on the three decision sessions that result from the segmentation of the deliberations of the day. The authors find that in each session, favorable rulings drop gradually from ≈65% to nearly zero, and then returns abruptly to ≈65% after each break. In other words, judges are less likely to deny prisoners' requests after a food break. The authors claim that: "Our findings suggest that judicial rulings can be swayed by extraneous variables that should have no bearing on legal decisions." [65]

[61] Daniel Chen, Yosh Halberstam and Alan C. L. Yu, 'Perceived Masculinity Predicts U.S. Supreme Court Outcomes' (*PLoS One,* 2016) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5063312/> accessed on May 22, 2019.
[62] Ibid.
[63] Merton (n 17) 124-5.
[64] Wilson, (n 25).
[65] S. Danziger, , J. Levav and L. Avnaim-Pesso, 'Extraneous Factors in Judicial Decisions' (2011) 108(17) Proc Natl Acad Sci USA 6889 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3084045/> accessed on May 22, 2019.

The considerations highlighted in the analysis of the previous paper are valid for this study. The researchers allow the tool (Artificial Intelligence) to be the protagonist of their study and relegate the meaning (the legal research) to a secondary position. Again, it is not clear what the significance of this research is, and consequently, the interference in the life of the judges who unwillingly 'participated' in this research is highly problematic from an ethical point of view. However, as a point of difference with the previous paper, the researchers of this study hazard some conclusive considerations that lack enough scientific basis. Indeed, on the one hand they claim not to aim to provide evidence for a causal connection between food breaks and judges' decisions, but on the other hand they conclude that: "Nevertheless, our results do indicate that extraneous variables can influence judicial decisions … our findings support the view that the law is indeterminate by showing that legally irrelevant situational determinants—in this case, merely taking a food break—may lead a judge to rule differently in cases with similar legal characteristics."[66] In doing so, the authors commit one of the most naïve mistakes in scientific research. They confuse correlation with causation. A similar study, with the stewardship of legal scholars, would have not fall in such a gross mistake.

Furthermore, Li et al. propose a quantitative and unbiased approach to analyze judicial opinions that are published without indicating individual authorship. The authors claim that the analysis is needed because United States courts often publish judicial opinions on highly controversial issues without disclosing the authorship. They further argue that the anonymity of these judicial opinions impairs the accountability and transparency of the judicial system, and it deprives scholars, political commentators and electors of valuable information. By using a data set of SCOPUS decisions, Li et al. run natural language processers to predict authorship of judicial opinions. The authors provide an illustrative example by applying their process to the Obamacare decision, "in which the authorship of a joint dissent was subject to significant popular speculation. We conclude with a chart predicting the author of every unsigned per curiam opinion during the Roberts Court."[67]

Li et al.'s study is a clear and dangerous example of how Big Data can be used to infer information. As highlighted in part III of this paper, there is a general misunderstanding that since information is available to the public, using it do not produce harm to the human subject of the study. The example of Li et al.'s study highlights how this assumption is misguided. We acknowledge that there is an interest in discovering the authorship of judicial opinions, and that the lack of authorship impair accountability. However, we also have to acknowledge that the case analyzed by the paper (Obamacare) is a very controversial and delicate one, where the author of the judicial opinion has probably desired to conceal their identity for practical, and understandable reasons. The authors did not ask the human subject whether they wanted to participate in the study and, in outing them, the authors expose them to unnecessary harm. This is a clear example of the fact that only because the technology apt to undergo a certain research exists, it does not mean that researchers have the right to use it. The right to conduct research is not an absolute one, and it needs to be juxtaposed with society interests, and, in particular, the interests of the 'participants' of the study.

There are many other studies that can be briefly analyzed. A couple of further examples are Verma, Parthasarathy and Chen's study, which uses machine learning techniques to find patterns in cases in the United States courts of appeals that contribute in determining dissent. The authors identify some factors that determine dissent, such as the length of the opinion, the number of citations in the opinion, the voting valence, and how judges sit together. From this

[66] Ibid.

[67] W. Li and others 'Using Algorithmic Attribution Techniques to Determine Authorship in Unsigned Judicial Opinions' (2013) 16 Stan. Tech. L. Rev. 503.

discovery, the authors indicate that when these factors meet some thresholds, they can be used to predict dissent. They conclude that: "From our results, this implies that judges who write opinions in a similar manner and sit together often are more likely to agree, while longer opinions, opinions with more citations in them, and the valence all contribute to determining when judges dissent."[68] Moreover, Katz, Bommarito, and Blackman use machine learning to construct a model designed to predict SCOPUS behavior in a generalized, out-of-sample context. Using data available prior to decision, the authors create a model able to predict more than 240,000 justice votes and 28,000 cases outcomes between 1816 and 2015. They highlight that their model can be used to predict future decisions. The authors conclude in saying: "We encourage additional applied machine learning research directed to these areas and new areas where the application of predictive analytics might be fruitful. At its core, our effort relies upon a statistical ensemble method used to transform a set of weak learners into a strong learner."[69] We also encourage the use of Artificial Intelligence and machine learning to analyze courts' decisions. But we stress the need for a solid understanding of the law, and a clear statement of the benefit that potential new investigation would bring before embarking on these analyses.

These examples illustrates the alarming process which the legal discipline is undergoing through the use of Artificial Intelligence; just the same As Merton warns with regard to the discipline of economy: "The intellectual discipline of economics itself becomes technicized. Technical economic analysis is substituted for the older political economy included in which was a major concern with the moral structure of economic activity. Thus doctrine is converted into procedure. In this sphere as in others, the technicians form a closed fraternity with their own esoteric vocabulary. Moreover, they are concerned only with what is, as distinct from what ought to be."[70]

Conclusion

In this paper we argue that Artificial Intelligence is a valuable tool to advance legal research. However, the 'Technical Man' should not fall in the trap of extreme fascination with technology. Technology is a tool to conduct research, but not a research methodology on itself. By providing examples from the literature on legal research supported by Artificial Intelligence tools, this paper has explained that the use of Artificial Intelligence to conduct research should be done with the stewardship of legal scholars. This is for two reasons.

First, as Merton states, "Democratization is tantamount to the progressive elimination of restraints upon the exercise and development of socially valued capacities".[71] The examples addressed in part IV do not fulfil science's goals because it is not clear in which way they advance knowledge or contribute to society. This is because, if the bases of the scientific methods are not respected — the problem is clearly stated and understood, the logical premises of the study are explained and the reasons for undertaking a certain research are highlighted — research loses its meaning. The examples provided in part IV showcase a number of instances in which researchers have used Artificial Intelligence to conduct legal research enquiries without explaining the reasons and the rationale for their research. What we are left with is a

[68] Shivam Verma, Adithya Parthasarathy, and Daniel L. Chen, 'The Genealogy of Ideology: Predicting Agreement and Persuasive Memes in the U.S. Courts of Appeals' (*SSRN*, 2016) <http://nber.org/~dlchen/papers/The_Genealogy_of_Ideology.pdf> accessed on May 22, 2019.
[69] Daniel Martin Katz1, Michael J Bommarito II and Josh Blackman, 'A General Approach for Predicting the Behavior of the Supreme Court of the United States' (*SSRN*, 2017) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2463244> accessed on May 22, 2019.
[70] Ellul (n 3).
[71] Merton (n 17) 120.

plethora of sterile studies which do not aim to advance knowledge, rather they are only meant to showcase the technology used. In our opinion, similar studies would have been much more meaningful, and they would have produces useful knowledge, if they were conducted with the support of legal scholars.

Second, because the research questions are not clear, and the social benefits are overlooked, the interference of the researchers in the life of the (unknowing) 'participants' is unnecessary and unjustifiable. The examples provided in part IV do not comply with the data minimization principle proposed in the GDPR, and in general, miss the mark in relation to ethical conduct for research involving human participants. Most notably, the case study conducted by Li et al. expose judges to potential harm by outing their controversial opinions on Obamacare. Computer scientists and applied mathematics scholars, who usually conduct the studies analyzed in part IV, are not historically engaged in research on human subjects, and they also seem to imply that, because data is publicly available, they do not harm the human participants. This is a misguided assumption. The collaboration between computer and mathematics scientists and legal scholars will be useful to overcome some of the ethical issues discussed.

Merton wrote his work in 1942, almost 80 years ago. Ellul wrote his almost 60 years ago. And yet, their warning seems to be more relevant than ever in our age of Artificial Intelligence and Big Data. We urge the academia to "reexamine its foundations, restate its objectives, seek out its rationale",[72] to use Merton's words. What we have discussed in this paper is a sign of crisis that 'invites self-appraisal'. The 'Technology Man' is assaulting the tower of ivory which in turn becomes untenable.

[72] Ibid 115.